PRESCRIPTION BURNING AT McARTHUR-BURNEY FALLS MEMORIAL STATE PARK

Background

Warm soil temperature and abundant soil moisture are necessary for maximum plant growth and complete decomposition within an ecosystem. While both are present year around in tropical Jungles, this is not true in the temperate forests of California. Consequently, the mixed-conifer and pine/oak forest of McArthur-Burney Falls Memorial State Park accumulates dead organic matter (wood and leaves) over time.

The combination of available wood; warm, dry summers; and ignition sources (lightning and human caused) means that for most years, wildland fires of all intensities occur in Northeastern California. Fire releases the nutrients bound in this organic debris to the air and soil. Indeed, the plants and animals of the pine/oak and mixed-conifer forests have evolved unique characteristics and behaviors to survive fire; to avoid fire; or to exploit the nutrient rich, micro-environment after fire.

Current Conditions at the Park

The Department has managed the property around Burney Falls for over 7 decades. The general management philosophy for the first 50 years of this tenure was one of conservation/protection. Wildland fires were suppressed, and there have been no major wildfires on the property since it became a park. During that time many changes occurred, some dramatic, some subtle. By the mid-1970s, Department staff recognized that the forests had gradually changed, and some of the changes were not desirable. The living and dead biomass had increased on each acre of wildland (i.e., higher tree density, larger tree size, and more dead standing and downed wood). Most of the increase came in the form of Douglas-fir and incense cedar that are able to reproduce and grow under the shade of the dominant pines and oaks.

Until the late 1970s, the living biomass had been increasing steadily in the park. The 1977-78 drought, and the longer one in the mid 1980s, lowered the available soil water causing severe water stress in the living trees. Subsequently, the native bark beetles, responding to chemical signals emitted by the water-stressed trees, began to attack the dominant pines. This led to a bark beetle population explosion and a massive pine die-off both within the park and throughout the surrounding area.

The Department responded in several ways. During the 1980s, several thousand dead pines were removed, which reduced the fire hazard but did nothing to interrupt the bark beetle epidemic. In 1984, a small prescribed burn was conducted in the mixed-conifer forest north of the rim campground loop, again to further reduce biomass. During the latter half of the 1990s, the forest was thinned of dying and low-vigor trees in and around the campgrounds in order to reduce the stress on the remaining trees.

Despite these efforts, many areas of the park still have high tree densities and fuel loads. Even areas that were treated over 10 years ago now have sufficient ground fuels to support a fire. The Department wishes to avoid both insect epidemics and extreme wildfires such as the Fountain Fire. This wildfire was started by arson on August 20, 1992, southwest of Moose Camp, California. It advanced 11 miles to the outskirts of the town of Burney in 33 hours and destroyed 636 structures making it the third worst fire in California History. The fire was finally contained at 63,960 acres only after the weather had changed.

The solution will require a combination of mechanical wood removal and understory prescription burning. The solution will not prevent all bark beetle attacks, but will discourage epidemics. The solution will not prevent extreme fires from entering the park, but it will dramatically reduce damage to park facilities and natural and cultural resources when such an incident occurs.

Prescribed Burns

The Department wants to capitalize on the previous fuel reduction work by burning those areas (total = 96 acres) where the forest was thinned 10+ years ago. These will be low to moderate intensity burns in the understory of the mixed-conifer and pine/oak forests north and east of the campground loops. The burns have two objectives.

1. A low fuel buffer around the campground will limit wildfire damage for ten years.
2. Plant and animal biodiversity will be increased through the: 1) creation of new snags and new downed logs; 2) consumption of accumulated litter/duff thus recycling nutrients and producing new mineral soil seed bed for pines, junipers and oaks; 3) creation of openings in the forest canopy which improve the survival of pine, juniper and oak seedlings/saplings; and 4) elimination of seedling/sapling sized fir and cedar which compete with the pine, oak and juniper.

Logistics

The burns will be a cooperative effort among park staff, local California Department of Forestry and Fire Protection staff, and an inmate crew from the Intermountain Conservation Camp. Since these burns will produce smoke, the 96-acre area has been sub-divided into numerous plots to be burned on separate days. To further minimize smoke, the plots will be ignited only during daylight hours as required by the Shasta County Air Quality Management District.

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Figure 1.

Mixed-conifer forest north of Pioneer Campground Loop.
Forest Thinning in early 1980s.
Burn priority: First.

Figure 2.

Mixed-conifer forest north of Rim Campground loop.
Forest thinned in early 1980s. Understory prescribed burn conducted in 1984.
Burn priority: second

Figure 3.

Pine/oak woodland northeast of Pioneer Campground loop.
Burn priority: Third.